

CLAIMS

What is Claimed is:

- 1 1. A fin actuator(s), in a portable missile, that substantially limits backlash, comprising:
2 means for rotating a power shaft, said means for rotating operatively configured
3 to rotate said power shaft in a forward direction and a reverse direction;
4 means for converting rotational movement of said power shaft to linear
5 movement, wherein said means for converting rotational movement of said power shaft
6 includes a lead screw fixedly coupled to said power shaft, said lead screw having a lead
7 nut threadingly engaged moving linearly along said lead screw in relation to the direction
8 of rotation of said power shaft; and
9 means for converting said linear movement of said lead nut to rotational movement
10 of a fin shaft, wherein said means for converting said linear movement includes said lead nut
11 operatively coupled to a crank arm, said crank arm fixedly coupled to said fin shaft,
12 effecting the rotation of said fin shaft according to the linear movement of said lead nut.
- 1 2. The actuator(s) of claim 1, wherein said means for rotating a power shaft comprises a
2 reversible electric motor.
- 1 3. The actuator(s) of claim 1, wherein said lead screw, said lead nut, and said crank arm are so
2 constructed and coupled as to limit the total backlash of said actuator(s) measured at said fin
3 shaft to less than about 0.1 degrees.

1 4. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to fit in
2 said portable missile of less than about 5 lbs.

1 5. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to fit in
2 an actuator section of said portable missile of less than about 2 inches in diameter.

1 6. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to fit in
2 an actuator section of said portable missile of less than about 3 inches in length.

1 7. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to
2 provide at least about 50 oz-in of torque to said fin shaft.

1 8. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to
2 provide from at least about -20 degrees to at least about +20 degrees of deflection of said fin
3 shaft.

1 9. The actuator(s) of claim 1, wherein said crank arm and said fin shaft is a unitary structure.

1 10. A method for fin actuation(s), in a portable missile, that substantially limits backlash,
2 comprising:

3 providing a means for rotating a power shaft, said means for rotating operatively
4 configured to rotate said power shaft in a forward direction and a reverse direction;

5 providing a means for converting rotational movement of said power shaft to linear
6 movement, wherein said means for converting rotational movement of said power shaft includes
7 a lead screw fixedly coupled to said power shaft, said lead screw having a lead nut threadingly
8 engaged moving linearly along said lead screw in relation to the direction of rotation of said
9 power shaft; and

10 providing a means for converting said linear movement of said lead nut to rotational
11 movement of a fin shaft, wherein said means for converting said linear movement includes said
12 lead nut operatively coupled to a crank arm, said crank arm fixedly coupled to said fin shaft,
13 effecting the rotation of said fin shaft according to the linear movement of said lead nut.

1 11. The method of claim 10, wherein said means for rotating a power shaft comprises a
2 reversible electric motor.

1 12. The method of claim 10, wherein said lead screw, said lead nut, and said crank arm are so
2 constructed and coupled as to limit the total backlash measured at the fin shaft to less than
3 about 0.1 degrees.

1 13. The method of claim 10, wherein said fin actuation(s) occurs within a portable missile of
2 less than about 5 lbs.

1 14. The method of claim 10, wherein said fin actuation(s) occurs within an actuator section of
2 said portable missile of less than about 2 inches in diameter.

1 15. The method of claim 10, wherein said fin actuation(s) occurs within an actuator section of
2 said portable missile of less than about 3 inches in length.

1 16. The method of claim 10, wherein said fin actuation(s) provides at least about 50 oz-in of
2 torque to said fin shaft.

1 17. The method of claim 10, wherein said fin actuation(s) provides from at least about -20
2 degrees to at least about +20 degrees of deflection of said fin shaft.

1 18. The method of claim 10, wherein said crank arm and said fin shaft is a unitary structure.

1 19. A fin actuator(s), in a portable missile, that substantially limits backlash, comprising:
2 a reversible electric motor for rotating a power shaft, said power shaft extending
3 from said motor;
4 a lead screw fixedly coupled to said power shaft, said lead screw having a lead nut
5 threadingly engaged moving linearly along said lead screw in relation to the direction of
6 rotation of said power shaft; and
7 said lead nut operatively coupled to a crank arm, said crank arm fixedly coupled to
8 said fin shaft, effecting the rotation of said fin shaft according to the linear movement of said
9 lead nut.

1 20. The actuator(s) of claim 19, wherein said lead screw, said lead nut, and said crank arm are
2 so constructed and coupled as to limit the total backlash of said actuator(s) measured at said
3 fin shaft to less than about 0.1 degrees.

1 21. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to fit in
2 said portable missile of less than about 5 lbs.

1 22. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to fit in
2 an actuator section of said portable missile of less than about 2 inches in diameter.

1 23. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to fit in
2 an actuator section of said portable missile of less than about 3 inches in length.

1 24. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to
2 provide at least about 50 oz-in of torque to said fin shaft.

1 25. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to
2 provide from at least about -20 degrees to at least about +20 degrees of deflection of said fin
3 shaft.

1 26. The actuator(s) of claim 19, wherein said crank arm and said fin shaft is a unitary structure.